

CLAIMS

Having thus described the invention, what is claimed is:

- 1 1. A method of fabricating at least a pair of local interconnects with
2 one interconnect on each side of a gate of a field effect transistor (FET) in an
3 integrated circuit on a semiconductor substrate comprising the steps of:
4 forming on a semiconductor substrate a thick insulating layer;
5 forming at least a pair of spaced apart openings in the insulating layer
6 adjacent the semiconductor substrate;
7 forming a source in one of the openings and a drain in the other of
8 the openings;
9 filling each of the openings with a conductive material to form local
10 interconnects to the source and drain;
11 removing a portion of the insulating layer to form a gate opening
12 between the local interconnects;
13 forming a gate dielectric on the semiconductor substrate in the gate
14 opening; and
15 forming a gate on the gate dielectric oxide in the gate opening
16 between the local interconnects.
- 1 2. The method of Claim 1, wherein the space between the pair of
2 openings is one minimum photolithographic feature and the local interconnects are
3 each one minimum photolithographic feature.
- 1 3. The method of Claim 1, wherein insulating spacers are each
2 disposed on an interconnect wall adjacent the gate to separate each of the local
3 interconnects from the gate.

1 4. The method of Claim 1, wherein the source and drain are formed
2 by implanting impurities in the pair of openings in the insulating layer.

1 5. The method of Claim 1, wherein the portion of insulating layer
2 removed to form the gate opening is removed by using a masking material with an
3 opening in the masking material positioned between the pair of local interconnects.

1 6. The method of Claim 5, wherein the opening in the masking
2 material extends over but not beyond each of the pair of local interconnects.

1 7. The method of Claim 6, wherein the spaced apart openings are
2 positioned over an active region in the semiconductor substrate, the active region
3 being surrounded by an isolation region, the openings extending to or beyond the
4 active region.

1 8. The method of Claim 1, wherein a conductive layer is formed on
2 the walls of the spaced apart openings to line the openings and a remainder of the
3 local interconnect openings are filled with another conductive material.

1 9. The method of Claim 8, wherein the conductive layer is
2 polysilicon and the other conductive material is tungsten.

1 10. The method of Claim 9, wherein the polysilicon is the origin for
2 the impurities for the source and drain.

1 11. The method of Claim 1, wherein a barrier layer is formed on
2 walls of the local interconnect openings to line the opening and a remainder of the
3 local interconnect opening is filled with a conductive material.

1 12. The method of Claim 11, wherein the barrier layer includes
2 titanium nitride.

1 13. The method of Claim 1, wherein an insulating etch stop layer is
2 formed on semiconductor substrate before forming the thick insulating layer.

1 14. The method of Claim 13, wherein the etch selectivity of the etch
2 stop layer is different from the etch selectivity of the insulating layer.

1 15. The method of Claim 14, wherein the etch stop layer is a nitride
2 of silicon.

1 16. The method of Claim 1, wherein the gate is selected from the
2 group of polysilicon, refractory metal and metal.

1 17. In a method of fabricating, in an integrated circuit on a
2 semiconductor substrate, a field effect transistor (FET) having a source, drain and
3 gate and with one interconnect on each side of a gate of the FET comprising the
4 steps of:
5 forming on a semiconductor substrate a thick insulating layer;
6 forming a pair of spaced apart openings in the insulating layer
7 adjacent the semiconductor substrate, each opening being the size of a minimum
8 lithographic feature;
9 forming a source in one of the openings and a drain in the other of
10 the openings;
11 filling each of the openings with a conductive material to form local
12 interconnects to the source and drain;

13 removing a portion of the insulating layer to form a gate opening of a
14 minimum lithographic feature between the local interconnects; and
15 forming a gate in the gate opening between the local interconnects,
16 whereby the size of the FET transistor is three minimum lithographic features.

1 18. The method of Claim 17, wherein openings in the insulating
2 material are positioned over an active region in the semiconductor substrate, the
3 active region being surrounded by an isolation region, and the openings extending
4 to or beyond the active region.

1 19. An integrated circuit including at least one transistor, the
2 integrated circuit comprising:
3 a pair of local interconnects spaced from each other by a minimum
4 lithographic feature and each being a minimum lithographic feature; and
5 a gate of the transistor disposed in the space between the local
6 interconnects and separated from each of the local interconnects by an insulating
7 liner, whereby the width of the transistor is not greater than three lithographic
8 features.

1 20. The integrated circuit of Claim 19, wherein insulating spacers
2 are each disposed on a interconnect wall adjacent the gate to separate each of the
3 local interconnects from the gate.

1 21. An integrated circuit including at least one transistor, the
2 integrated circuit comprising:

3 a pair of local interconnects spaced from each other; and

4 a gate of the transistor disposed in the space between the local
5 interconnects and separated from each of the local interconnects by an insulating
6 liner.

1 22. The integrated circuit of Claim 21, wherein the pair of local
2 interconnects are spaced from each other by a minimum lithographic feature.

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